

## MediaTek Pump Express™-Compatible Digital PWM AC/DC Controller

### 1.0 Features

- Supports MediaTek Pump Express™ fast charge protocol
- Universal input off-line power supply controller for applications up to 7.5W output power
- No-load power consumption < 30mW at 230V<sub>AC</sub> with typical application circuit (5-star rating)
- PrimAccurate™ primary-side feedback eliminates opto-isolators and simplifies design
- Adaptive multi-mode PWM/PFM control improves efficiency
- Quasi-resonant operation for highest overall efficiency
- Meets stringent global energy efficiency standards
  - » US DoE, EU Code of Conduct Version 5.0
- Very tight constant voltage and constant current regulation over entire operating range
- Built-in power limit function reduces current limit with increasing output voltage
- Low EMI design enhances manufacturability
- Intrinsically low common mode noise
- Optimized 72kHz maximum PWM switching frequency achieves best size and efficiency
- Active start-up scheme enables fastest possible start-up
- Direct drive of low-cost BJT switch with dynamic base drive current
- No external loop compensation components required
- Built-in soft start
- Built-in protections for over-temperature protection (OTP), output short-circuit, output low impedance, and output overvoltage
- No audible noise over entire operating range

### 2.0 Description

The iW1680 is a high performance AC/DC power supply controller that uses digital control technology to build peak current mode PWM flyback power supplies and is compatible with the MediaTek Pump Express™ fast charge protocol. With PrimAccurate™ primary-side control technology, the iW1680 enables simple, low component count power supplies for universal input off-line applications requiring low BOM cost, high performance solutions. The iW1680 removes the need for secondary feedback circuitry and loop compensation components while achieving excellent stability and line and load regulation.

The Pump Express™ fast charge protocol enables communication between a smartphone and a wall adapter designed with the iW1680. The protocol allows the adapter to increase or decrease the output voltage of the adapter to optimize charge time. The built-in power limiting function increases the output current of the adapter as the voltage output decreases and decreases the output current of the adapter as the voltage output increases. This allows the designer to minimize the size of the external transformer without sacrificing performance.

The iW1680 directly drives a power BJT and operates in a quasi-resonant mode to provide high efficiency along with a number of key built-in features including simplified EMI and a full range of protection features from over-temperature, over-voltage and short-circuit.

Dialog's innovative proprietary technology ensures that power supplies built with the iW1680 can achieve both the highest average efficiency and less than 30mW no-load power consumption, enabling adapters and chargers that easily meet international energy efficiency standards without compromising on performance. The active start-up scheme enables the shortest possible start-up time without sacrificing no-load power loss. A full range of protection circuits guarantee not only performance, but also the robustness needed for modern electronics.

### 3.0 Applications

- Compact AC/DC adapter/chargers for cell phones, PDAs, digital still cameras
- Fast Charge enabled adapters for smartphones
- Linear AC/DC replacement

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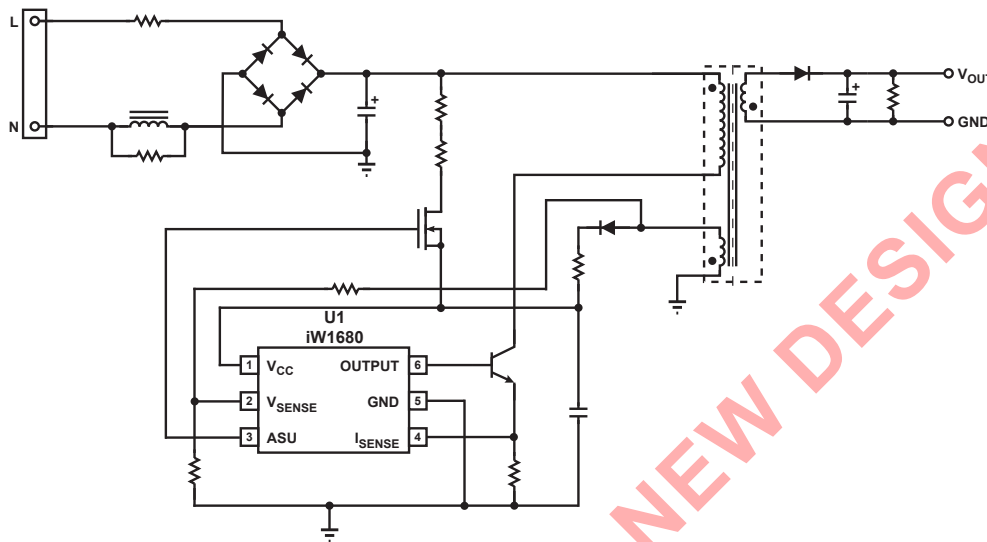


Figure 3.1: iW1680 Typical Application Circuit

(Achieving < 30mW No-load Power Consumption. Using Depletion Mode NFET as Active Start-up Device)

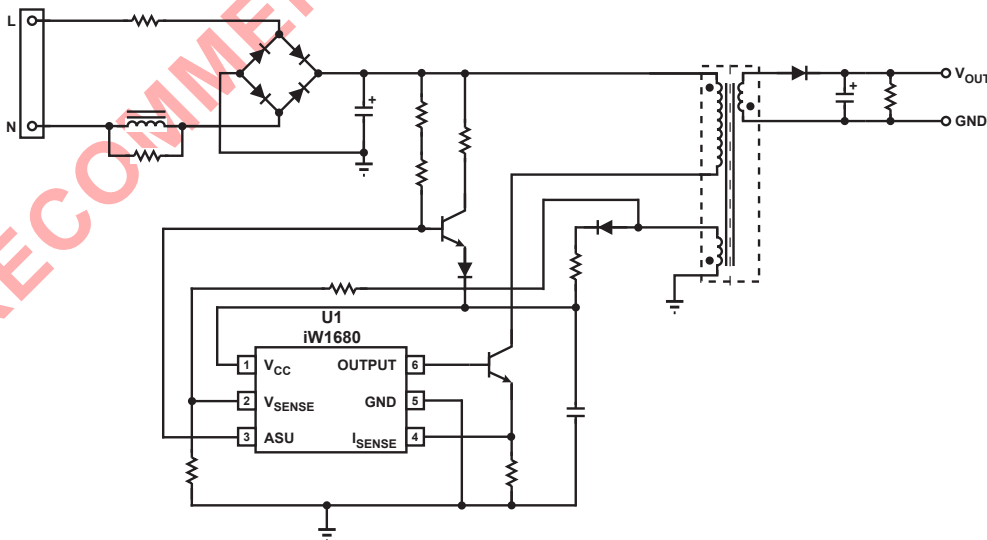


Figure 3.2: iW1680 Typical Application Circuit

(Achieving < 30mW No-load Power Consumption. Using NPN BJT as Active Start-up Device)

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### 4.0 Pinout Description

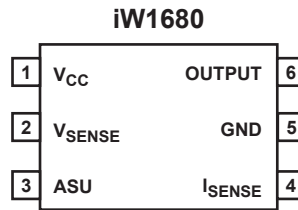


Figure 4.1: 6 Lead SOT-23 Package

Pin #	Name	Type	Pin Description
1	V <sub>CC</sub>	Power Input	IC power supply.
2	V <sub>SENSE</sub>	Analog Input	Auxiliary voltage sense. It is used for primary regulation.
3	ASU	Output	Control signal for active start-up device (BJT or Depletion NFET).
4	I <sub>SENSE</sub>	Analog Input	Primary current sense. It is used for cycle-by-cycle peak current control and limit.
5	GND	Ground	Ground.
6	OUTPUT	Output	Base drive for BJT.

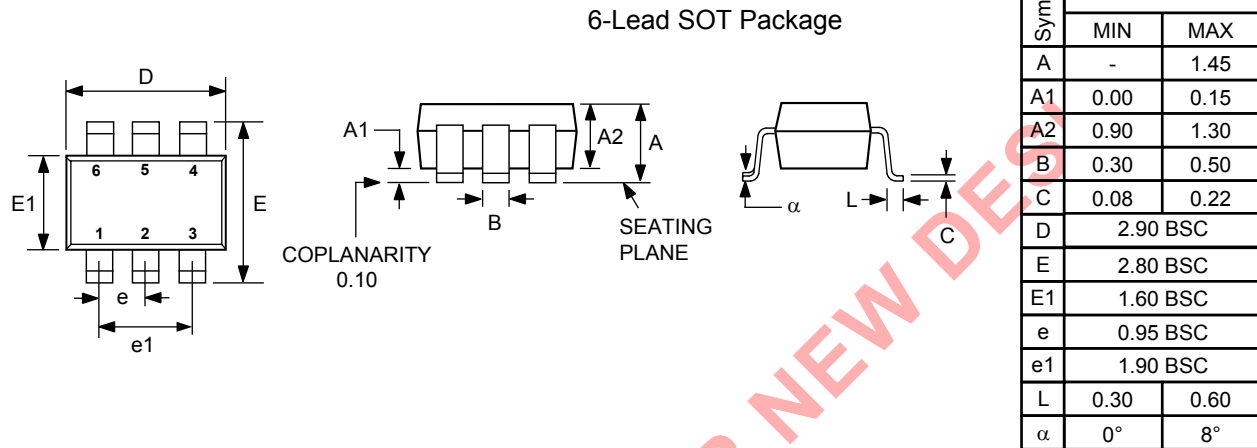
### 5.0 Absolute Maximum Ratings

Absolute maximum ratings are the parameter values or ranges which can cause permanent damage if exceeded. For maximum safe operating conditions, refer to Electrical Characteristics in Section 6.0 in the iW1680 datasheet.

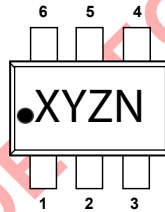
Parameter	Symbol	Value	Units
DC supply voltage range (pin 1, I <sub>CC</sub> = 20mA max)	V <sub>CC</sub>	-0.3 to 18.0	V
Continuous DC supply current at V <sub>CC</sub> pin (V <sub>CC</sub> = 15V)	I <sub>CC</sub>	20	mA
ASU output (pin 3)		-0.3 to 18.0	V
Output (pin 6)		-0.3 to 4.0	V
V <sub>SENSE</sub> input (pin 2, I <sub>VSENSE</sub> ≤ 10mA)		-0.7 to 4.0	V
I <sub>SENSE</sub> input (pin 4)		-0.3 to 4.0	V
Maximum junction temperature	T <sub>J MAX</sub>	150	°C
Storage temperature	T <sub>STG</sub>	-65 to 150	°C
Thermal resistance junction-to-ambient	θ <sub>JA</sub>	190	°C/W
ESD rating per JEDEC JESD22-A114		2,000	V
Latch-up test per JEDEC 78		±100	mA

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### 6.0 Physical Dimensions



SOT23-6 devices are marked with a 4-digit code. Orientation of Pin 1 is shown below:



Compliant to JEDEC Standard MO-178AB

Controlling dimensions are in millimeters

This package is RoHS compliant and Halide free.

Soldering Temperature Resistance:

- [a] Package is IPC/JEDEC Std 020D Moisture Sensitivity Level 1
- [b] Package exceeds JEDEC Std No. 22-A111 for Solder Immersion Resistance; packages can withstand 10 s immersion < 260°C

Dimension D does not include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.25 mm per side.

The package top may be smaller than the package bottom. Dimensions D and E1 are determined at the outermost extremes of the plastic body exclusive of mold flash, tie bar burrs and interlead flash, but including any mismatch between top and bottom of the plastic body.

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### 7.0 Ordering Information

Part Number	Options	Package	Description
iW1680-20	Cable Comp = 0mV, CC shutdown voltage = 1.5V, up to 5W	SOT-23	Tape & Reel <sup>1</sup>
iW1680-21	Cable Comp = 300mV, CC shutdown voltage = 1.5V, up to 5W	SOT-23	Tape & Reel <sup>1</sup>
iW1680-23	Cable Comp = 450mV, CC shutdown voltage = 1.5V, up to 5W	SOT-23	Tape & Reel <sup>1</sup>
iW1680-25	Cable Comp = 150mV, CC shutdown voltage = 1.5V, up to 5W	SOT-23	Tape & Reel <sup>1</sup>
iW1680-50	Cable Comp = 0mV, CC shutdown voltage = 1.5V, up to 7.5W	SOT-23	Tape & Reel <sup>1</sup>
iW1680-51	Cable Comp = 300mV, CC shutdown voltage = 1.5V, up to 7.5W	SOT-23	Tape & Reel <sup>1</sup>
iW1680-53	Cable Comp = 450mV, CC shutdown voltage = 1.5V, up to 7.5W	SOT-23	Tape & Reel <sup>1</sup>
iW1680-55	Cable Comp = 150mV, CC shutdown voltage = 1.5V, up to 7.5W	SOT-23	Tape & Reel <sup>1</sup>

Note 1: Tape & Reel packing quantity is 3,000 per reel. Minimum ordering quantity is 3,000.

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Dialog Semiconductor's statement on RoHS can be found on the customer portal <https://support.diasemi.com/>. RoHS certificates from our suppliers are available on request.

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